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ATLANTIC WIND TEST SITE

FIRST ANNUAL REPORT

FOR THE

CENTER OF EXPERTISE FOR WIND ENERGY
RESEARCH AND DEVELOPMENT IN CANADA

To

Energy, Mines and Resources Canada
Solar Energy Development Program
Wind Energy Division

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INSTITUTE OF MAN AND RESOURCES
ATLANTIC WIND TEST SITE

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PREFACE

This report presents the results of the first year of a program to provide a Center of Expertise in wind energy at the Atlantic Wind Test Site.

The report summarizes the background, objectives and activities of the program and recommends that the benefit of the program to the wind energy community in Canada be continued.

ABSTRACT

The Atlantic Wind Test Site at North Cape, Prince Edward Island has been established as a Center of Expertise to assist and encourage the design, development and application of safe, reliable and economic wind energy conversion systems. The Center of Expertise is funded by the Solar Energy Development Program of Energy, Mines and Resources Canada. The resources of the Center of Expertise are available to industry, government, utilities and individuals by request to the Atlantic Wind Test Site and/or EMR's Solar Energy Development Program. In its first year of operation the program provided assistance and advice to private and government groups.

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FIRST ANNUAL REPORT FOR THE CENTER OF EXPERTISE FOR WIND ENERGY RESEARCH AND DEVELOPMENT IN CANADA

INTRODUCTION

Wind energy research and development in Canada was commenced by the National Research Council (NRC) in association and cooperation with several other agencies and organizations. Some of these other participants were the provincial power corporations, Indal Technologies Inc. (formerly DAF Indal), IREQ, Lavilan (formerly Shawinigan Engineering), Canada Air, Bristol Aerospace, Adecon Energy Systems, the Institute of Man and Resources (IMR) and others. Most of the participants were involved in specific projects oriented around specific hardware and technology. IMR however, through development of the Atlantic Wind Test Site (AWTS) and involvement in many varied research and development projects emerged as a more broadly based organization with resources and expertise in many areas. The National Research Council's Energy Division recognizing this circumstance selected AWTS as a national Center of Expertise in 1981 and established a ten year contribution and operating agreement with the AWTS to enable AWTS to operate and to participate actively in Canadian wind energy technology development. The AWTS role being to provide testing and evaluation services and serve as a national resource for assistance to industry, users and other interested organizations. The AWTS also participated actively in standards development, advisory groups in Canada and in international technical conferences and workshops.

In 1984 following announcement of the planned dismantling of the NRC Energy Division and transferal of the Canadian R&D mandate to Energy, Mines and Resources (EMR) an industry workshop was convened by EMR at Montebello, P.Q., to provide input and advice to EMR for development of their planned R&D program. One of the elements recommended for inclusion in the program was the establishment and support of Centers of Expertise for wind energy and also for other renewable technologies. The recommendation specifically named the Atlantic Wind Test Site in Prince Edward Island and the Lethbridge Test Centre for water pumping turbine testing in Albedrta as the proposed Centers of Expertise for wind electrical and water pumping technology respectively.

In FY 1986 at commencement of the EMR sponsored R&D program a proposal to EMR for operation of a limited Center of Expertise program was presented to EMR. In April 1986 a $40,000 budget was approved and provided by EMR for performance of specific work to assist Canadian industry and others in the persuit of wind energy technology development.

Specific areas of work considered in this development of the Center of Expertise budget for FY 1986 were:

Testing:
1. performance testing at AWTS
2. field monitoring of demonstration WECS
3. site monitoring

Consulting and services:
1. participation in EMR Technical Advisory Committee
2. technical advice to EMR
3. demonstration project management
4. design assistance to small manufacturers

These work areas were intended for general guidance only, as it was anticipated that demands on the program may not necessarily conform to these preconceived needs.

OBJECTIVES

Specific objectives, activities, and responsibilities of the Center of Expertise were:

1. To maintain facilities, resources, equipment, and personnel capabilities to test and evaluate electrical wind energy conversion systems for utility scale grid-connected application, fuel saving in remote communities supplied by diesel generators, and stand-alone systems requiring energy storage.
2. To establish a comprehensive facility and capability to carry out research and development in wind/diesel technology in companionship with industry and utilities.
3. To develop and conduct research and development projects for government, industry, and users that lead to advances in Canadian wind energy technology.
4. To assist government(s) in the development of programs and projects designed to encourage the achievement of goals for reliable, safe, and economical WECS equipment.

5. To develop techniques for evaluating power and operational performance, reliability, economic performance, and safety factors of electrical wind energy conversion systems (EWECS).
6. To manage, advise and provide equipment and personnel to evaluate and monitor WECS demonstration projects at AWTS and throughout Canada.
7. To provide technical advice and information to government(s), industry, and other wind energy community in regard to design, safety, performance, reliability, applications, economics, and other topics related to WECS technology and to provide advice and assistance towards the development of Canadian WECS' standards.
8. To establish and maintain technical liaison with international organizations conducting similar activities and to maintain awareness of standards and techniques for testing of performance, safety, and reliability.
9. To establish and maintain a centre of information that is able to:
   (a) provide, locate, and identify sources of technical information, reports, proceedings, experience, and advice to the wind energy community;
   (b) provide current information with regard to ratings, performance, reliability, operating expenses, and cost of Canadian and internationally available EWECS.;
   (c) provide information to government, private and general interest groups.
10. To provide consulting service and advice to Energy, Mines and Resources (EMR) and to coordinate or direct specific projects or programs at the direction of EMR.
11. To establish a working relationship between EMR and AWTS whereby these actions may be delivered and reported to EMR and the wind energy community in a coordinated and efficient fashion.

ACTIVITIES

The following is a summarized account of activities and services provided by the Center of Expertise in the first term.

Technical Advisory Committee Meetings

Technical Advisory Committee Meetings were attended and chaired by Malcolm Lodge on May 5, 1986, October 21, 1986 and June 16 1987.

Contractor Meetings

Meetings were held with Buchan, Lawton and Parent Ltd., NRC and EMR to initiate work and review progress on development of a wind/diesel simulation model. Meetings were held on July 29, 1986, October 22, 1986, February 3, 1987 and June 17, 1987.

Other Meetings

Malcolm Lodge attended an IEA wind/diesel subcommittee in Vastervik, Sweden, June 3, 4 and 5, 1987.

Conferences, Workshops

M. Lodge prepared and presented the following papers:

Parallel Generation with Wind Turbines - Technology and Experience, Canadian Electrical Association Conference, Vancouver, B.C., March 31, 1987.

Wind/Diesel Research and Development in Canada, Rutherford Appleton Laboratory Wind/Diesel Workshop, Chilton, England, June 1 & 2 1987.

Consultations

- M. Lodge visited Isles de la Madeleine on November 19 and 20, 1986 to inspect and observe operation of the Heli-O-Beauce wind turbine erected there. A trip report describing findings and recommending further action has been prepared. The report recommends testing on site for the remainder of the year to determine basic operational characteristics and also to do a design review to identify potential design problems and provide input for possible design modification. The unit shows promise particularly as a wind turbine to provide direct space heating.
- M. Lodge visited the Northern Canada Power Commission (NCPC) in Edmonton on December 16 to assist with development of terms of reference for a RCDP wind energy project proposed for Cambridge Bay.

- Carl Brothers visited Heli-O-Beauce Inc. in St. George, P.Q. to inspect equipment and facilities. A report describing his findings and making recommendations for ongoing work has been prepared.

Other Work

Liaison has been initiated and maintained with Thermax and MBB regarding testing and evaluation of a prototype unit when available. Latest plans call for testing at AWTS commencing September 1987.

Project Cost Summary

Costs to date to perform the work described are summarized below.

Labour	$11,698
Direct	
Travel	8,112
Telephone	390
Misc.	192
	$20,392

CONCLUSION

During the first year of its operation the Center of Expertise performed many of the tasks planned. Testing and evaluation projects for Heli-O-Beauce and Thermax/MBB at AWTS did not materialize due to delays in production of the machines by the suppliers.

Expenditures were about half of those planned because of the non-availability of machines for testing.

The ability to provide advice and consulting services to industry and other government groups and to provide testing, monitoring and related work with minimum delay, and to quickly make agreements and arrangements provides for more efficient and responsive delivery of AWTS resources and dispersion of funds set aside for this activity in EMR's Solar Energy Development Program.

RECOMMENDATIONS

Although events and circumstances did not allow the Center of Expertise program to fully realize its planned goals, particularly in the area of testing and evaluation of equipment, the Center of Expertise was

effective in making provision of information, technical and expertise and other resources of the AWTS which otherwise would not have been so fully and quickly available.

The AWTS recommends that the program be continued and that no change in operation is necessary to effectively deliver the program.

A proposal for continuing work for 1987 has been presented to EMR's Solar Energy Development Program.